John Glenn
Biomedical Engineering Consortium

A Dual-Track Actuated Treadmill in a Virtual Reality Environment: A Countermeasure for Neurovestibular Adaptation in Microgravity

Accomplishments: Status Report

- **CCF Report**
  - In negotiations with Foster Miller Inc. (FMI) to settle on contract for construction of treadmill. At this point in time, two options are apparent:
    1) Construction of mechanical treadmill at CCF and control interface at FMI
    2) FMI used as consultant and entire system built in house
  - Conducting experiments related to movement on treadmill
    - Stair climbing
    - Walking around corners
    - Data will be used to exhibit realistic images in virtual reality (VR) display in conjunction with treadmill motion

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Accomplishments:

- **CCF Report**
  - Planning sessions have taken place with NASA Glenn VR lab to discuss direction and milestones for the coming year
    - Each group is developing detailed milestones
    - Experimental protocols are being designed for final testing with finished treadmill
    - Potential issues with regard to control and interface are being reviewed
  - Meetings have occurred with Dr. John Oas, Department of Otolaryngology at CCF and NASA Glenn personnel to discuss the use of the treadmill for vestibular deficient patients
    - Ideas were generated for future testing/rehabilitation applications

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Accomplishments:

- **NASA Glenn Report**
  - Modified VR Treadmill visualization to support stereoscopic viewing on supported hardware.
  - Investigated effect of eye-separation and stereo 'window' placement.
  - Initiated selection and acquisition of treadmill that can interface to VR systems at Glenn for further application development

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Publications/Presentations/Invited Lectures:

- Abstract accepted at the 2003 Summer Bioengineering Conference for the American Society of Mechanical Engineers
  - To be presented Friday, June 27th
  - http://www.asme.org/divisions/bed/events/summer03.html
- Manuscript in preparation

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Future Work:

- Near term
  - Contract for treadmill construction
  - Resolve control issues
  - Investigate new displays for VR
- Mid-term
  - Have all display, programming and testing protocols in place by the time treadmill is delivered to lab

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Schedule Updates/revisions:

- Developing new milestones with regard to the construction of the treadmill. This is highly dependent on where it will be built. The current plan is to have the treadmill finished by the end of April 2004. This allows for a full year (as scheduled) to integrate VR system and test subjects.

Issues:

- Contract negotiations will continue with Foster Miller, Inc. Contract must be negotiated soon to stay on schedule.